Cypress USB to Serial Quick Start and User Guide

Quick Start Developers Guide

This is a simple description of the steps needed to use the USB to serial reference design.

1. Setup Development Kit

The first step is to setup the necessary development kit. The development kit that will be used will depend on the choice of microcontroller. Simply follow the installation instructions that come with the development kit.

2. Customize Firmware

The next step is to customize the USB to serial firmware to fit your application. This will include changing the value of the vendor and product ID in the device descriptor. Other changes may also be necessary in the firmware if the application requires any specialized use of handshaking signals. Please refer to the design notes included in this package for an explanation of the firmware and where and how to make changes to it.

3. Connect Serial Device to Development Kit

Interface the USB to serial reference design with the existing serial device. A description of pin assignments and how to interface the devices is given in the hardware section of the design notes.

4. Enumerate Device

Connect the development kit, with the firmware running, to the USB port on the computer and make sure that it enumerated properly. This can be verified by opening the device manager and looking for a Human Interface Device that was created.

5. Test Firmware

Use the HidCom test application to test the device. This application begins by detecting the USB to serial device and sets the proper communication settings for it. At that point you can send and receive data, set and clear handshaking signals and read the state of the handshaking signals on the device.

6. Create INF file

After the firmware has been verified to function correctly, it is then necessary to create an INF file so that the enumeration process calls on the virtual port emulation driver. The HidCom test application has a button that is used to automatically generate an INF file that corresponds to the VID and PID which it is currently communicating with.

7. Install the Com Port emulation driver

Install the Cypress COM port emulation driver by simply running the HidComInst executable that comes with this package. To verify that the driver was loaded correctly you must look at the device manager once again. This time check under COM ports and make sure that the Cypress Virtual Port has appeared.

8. Run application

Run the software application that is supposed to work with your device. Connect it to the COM port associated with the virtual COM port. The virtual COM port is usually labeled with the number of the next unused COM port. For example if you have two ports on your system which are labeled COM1 and COM2 then the virtual COM port will be COM3.

USB to Serial Quick Start Demo Guide

1. Purpose

This section is intended to provide a step by step guide to getting the USB to Serial reference design up and running with a demo. This will provide the user with instant verification of the USB to Serial system functionality including driver, firmware, and hardware.

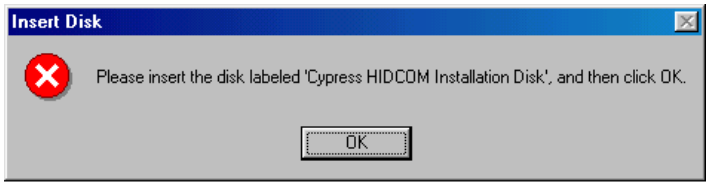
2. Installing the Driver

2.1 At the DOS prompt make sure the current working directory contains HidCOMInst, the INF file, and the drivers. These are all located in the Apps_and_Drivers folder of the reference design. Simply type "hidcominst". Nothing will appear to happen however this will remove any previous USB to Serial information and then copy the driver and INF file to the proper directories. The system is now ready for the device to be plugged in.

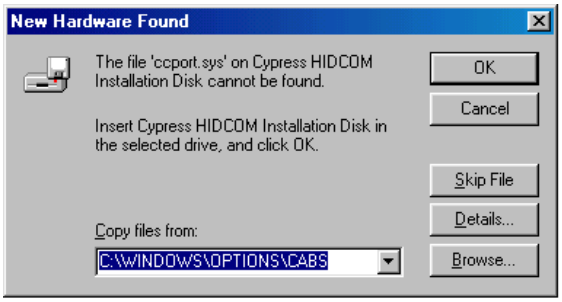
3. Plugging in the device

Under Win2K the driver should be located automatically so the following sequence doesn't apply. Therefore Win2K users should skip to section 3.5.

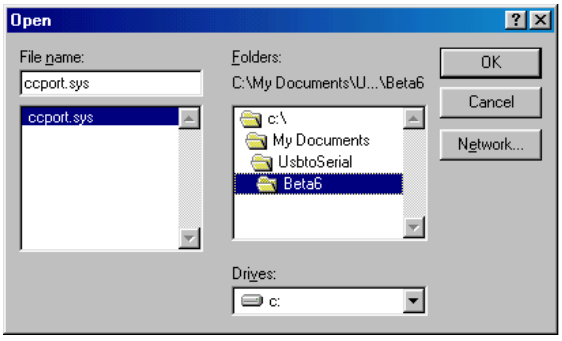
3.1 Once the device has been plugged in the following window will appear. Select OK.



3.2 Next the system will try and locate the driver. In the New Hardware Found window Click Browse.



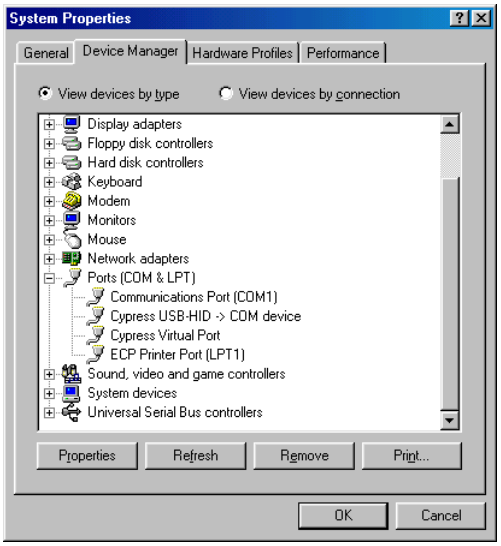
3.3 In the window below select the location containing the Ccport.sys driver. Note: The default location in the reference design is in the Apps_and_Drivers folder, not the location shown below.



3.4 After the correct location has been selected, click OK. Then click OK in the New Hardware Found window.

3.5 After a few seconds the device should finish enumerating. Verify that the device enumerated properly by checking the Device Manager.

3.5.1 On the desktop right click My Computer
3.5.2 Click Properties
3.5.3 In Win98 select the Device Manager Tab: In Win2K select the Hardware Tab and then click Device Manger
3.5.4 Check the Ports section and verify that the Cypress Virtual Port has appeared as below.

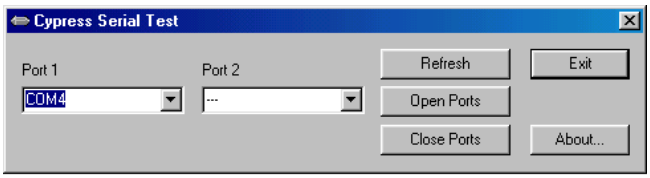


4. Demonstration using Serial Test

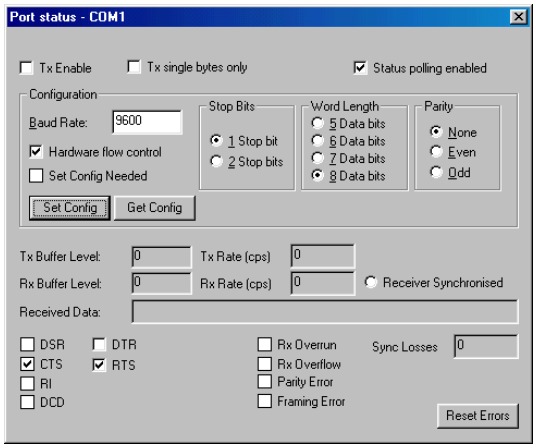
Serial Test provides the user with a visual indication that the USB to Serial system is functioning properly. Serial Test is an application that performs a loopback test over two ports, in this case the Cypress Virtual Port and a real Serial Port. It enables a given test vector to be transmitted and received between the two ports. The following steps will demonstrate data being looped back between these ports. For further information on Serial Test please refer to the Application's User Guide.

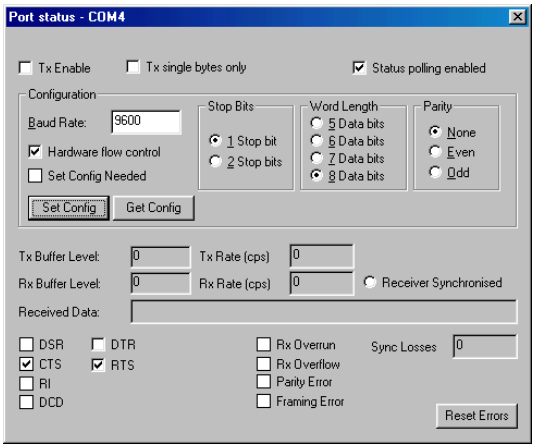
4.1 Plug in the USB to Serial device. Now attach an RS-232 Null Modem cable between the USB to Serial device and a COM port on the same PC.

4.2 Open up serial Test. The following screen will appear. Select one port as the Cypress Virtual Port, and the other as whichever COM port you attached the RS-232 cable to. Then click on Open Ports. Note: if unsure which port is the Cypress Virtual Port, simply unplug USB to Serial, click Refresh and see which port option disappeared.

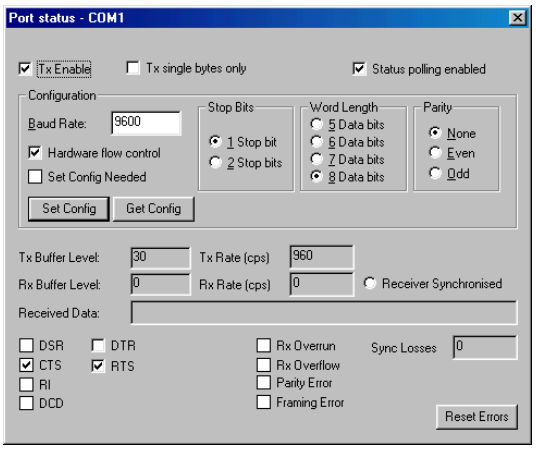


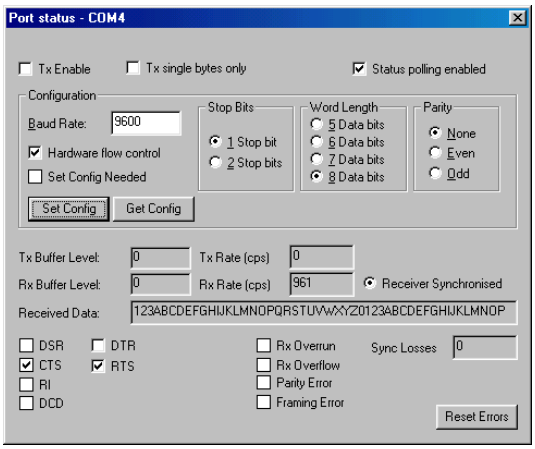
4.3 Upon opening the ports, two windows will open up as shown below (Move the first window aside to see the second). Click Hardware flow control in each window and then click Set Config in each window. Now communication is ready to take place.



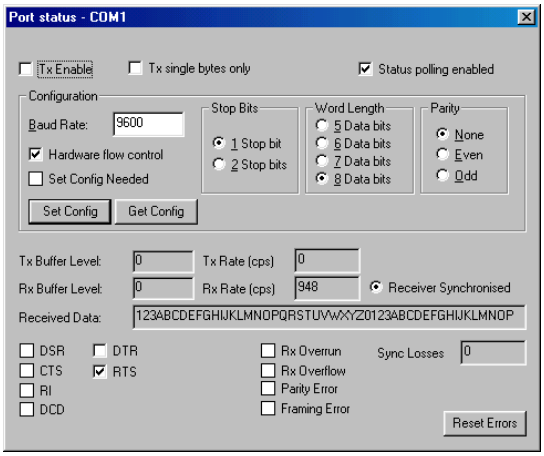


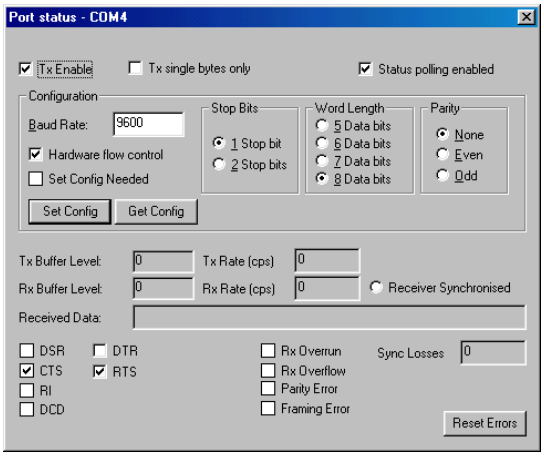
4.4 To transmit data, click the Tx Enable box in the top left corner of one of the windows. Data will begin to flood the Received Data box in the other window as shown below.





4.5 To reverse direction uncheck the Tx Enable and check it in the other box. Again, data will start to flood the other Received Data box as shown below. Note: If working with half duplex (CY7C64013 or CY7C63743) be sure that both Tx Enables are not checked at the same time.





4.6 When done, uncheck the Tx Enable, then click Close Ports on the opening screen.

5. Trouble Shooting

5.1 If the Driver isn't loading properly:

5.1.1 If a previous version of USB to Serial has been installed, reboot the PC and try again.

5.1.2 Try running HidCOMInst again, make sure USB to Serial is unplugged first.

5.2 If Serial Test isn't receiving data:

5.2.1 Make sure a null modem cable is used.

5.2.2 Make sure both port configurations match.

5.2.3 Make sure Hardware flow control is set accordingly.

5.2.4 Make sure Set Config Needed isn't flagged, if so click Set Config.

5.3 If you are using Windows XP

Under some circumstances, Windows XP fails to load the HIDCOM driver, and instead loads the Windows HID driver for the device. In this case, follow the steps below to force Windows to use the HIDCOM driver:

5.3.1 Open up the device manager.

5.3.2 Find the Human Interface Device key related to USB to Serial and right click on it.

5.3.3 Select Update Driver

5.3.4 Select "Install from list from specific location" and click Next.

5.3.5 De-select "Search removable media". Then select "Include this location in Search".

5.3.6 Click Browse. Find the directory containing the Ccport.sys driver and click OK. It is located in the Apps_and_Drivers directory of the reference design.

5.3.7 Select "Don't search, I will choose the driver to install". Then click Next.

5.3.8 Select "Cypress USB-HID -> COM device" and click Next.

5.3.9 Windows will prompt you for the HIDCOM.sys driver. Click Browse and locate HIDCOM.sys (also located in the Apps_and_Drivers directory of the reference design) and click Next.

USB to Serial Software Applications User Guide

1. Introduction

The purpose of this guide is to give a brief overview of the three host applications provided with the USB to Serial reference design.

- HidCOMInst
- HidCOMTest
- Serial Test

HidCOMTest and Serial Test are targeted at firmware development and testing while HidCOMInst is used for driver installation/uninstallation. This guide will outline the fundamental purpose of each program and then give a detailed description of how to use it.

2. HIDCOMINST

2.1 Purpose

HidCOMInst is a simple DOS command line application that copies the USB to Serial INF file and the corresponding driver(s) into their proper directories. It copies the INF file into the …/INF directory and the corresponding driver(s) Ccport.sys and/or HidCom.sys, into the …/SYSTEM32/DRIVERS directory. Without running this application, which installs the driver, the OS will determine the device is a HID device and attempt to load the HID driver instead of the USB to Serial driver. Once this has been done the OS will not prompt the user again for the USB to Serial Driver. To load the USB to Serial driver at this point, HidCOMInst should be run.

2.2 How to Use

HidCOMInst should be run before plugging in the device. At the DOS prompt, make sure the current working directory contains HidCOMInst, the INF file, and the drivers. In general just typing “hidcominst” in this working directory is all that is necessary. However deviations from this must be taken if the default INF file and or driver names have been changed. Therefore, unless any name changes have been made just type “hidcominst”. If name changes have been made the “-d” and “-i” parameters discussed below must be used.

Running HidCOMInst does two things. First it goes through and removes any registry entries, INF files, or drivers related to USB to Serial. After the system has been cleared of any possible previous USB to Serial installs, it then copies the current INF file into the …/INF directory and the related drivers into the …/SYSTEM32/DRIVERS directory. (Please make sure the system has been rebooted following any previous installs of earlier USB to Serial driver versions.) When it copies the INF file into the corresponding directory it changes the name to “oemX.inf”(X is an integer starting at zero).

HidCOMInst allows for five different parameters to be passed in when executed. They are as follows:

-h	Help Box
-u	Uninstall HidCom device
-i <infname>	Set .INF filename (defaults to HidCom.inf)
-d <drvname>	Set .SYS filename (defaults to HidCom.sys)
-v	Verbose

Note: When running HidCOMInst with the “-v” parameter, the verbose may give several failure warnings. Most of the time this is okay, these warnings usually occur because the INF file covers several different devices that may not be present on the current system.

3. HIDCOMTEST

3.1 Purpose

HidCOMTest is an application used to test the USB to Serial reference design with the standard HID driver. This allows firmware development to be isolated from the USB to Serial specific driver.

HidCOMTest can also be used to automatically generate an INF file for a customer’s device with a specific VID and PID.

3.2 How to Use

3.2.1 Setup

First make sure the USB to Serial driver isn't loaded. Do this by typing "hidcominst –u" at the DOS prompt in the directory containing HidCOMInst. If the driver was previously loaded this will uninstall it, if it wasn't loaded this won't cause any problems. Now the device is plugged in and should be able to be enumerate as a HID only device. When the install wizard comes up have it search the Windows/System directory (or wherever the HID driver is located). Verify it worked by looking in the Device Manager - there should be two entries in the HID section for USB to Serial (HID device, and HID compliant device).

If it didn't install as a HID do a search on the INF directory for oem0.inf, this file should have been removed by running "hidcominst –u". If it is still there then the device will enumerate with the USB to Serial specific driver instead of the HID driver so it needs to be deleted. Delete it and then try again by plugging in the device.

3.2.2 Communication

To use the application for performing full communication, both TX and RX (half duplex), a companion application such as hyperterminal or Serial Test needs to be opened. HidCOMTest will communicate with the virtual COM port while the companion application should be configured to communicate with the real COM port. Match all of the configuration settings, then anything typed into hyperterminal or transmitted from Serial Test should appear in the Receive window of HidComTest and vice versa; anything typed in Transmit of HidComTest should appear in hyperterminal or Serial Test.

Before attempting communication, be sure to configure the proper baud rate, data bits, parity, and stop bits for both ports. Once selected click the "Send Config" button. At this point communication is ready to take place.

Different check boxes are also provided to enable DTR, RTS, and Reset.

3.2.3 Create INF Files

The "Write .INF" option allows the user to automatically add their specific VID and PID into the INF file without having to manually edit HidCom.INF. This will customize the INF file for use with their product.

The "Devices Found" window displays the VID and PID of all HID devices connected to the system. Select the corresponding USB to Serial device and click the "Write .INF" button. This will create a customized INF file by simply adding a few lines with the specific VID and PID to the default HidCom.INF file.

4. SERIAL TEST

4.1 Purpose

Serial Test is an application that allows the user to perform simple loopback testing. In its most basic form, Serial Test provides a means for displaying received data or transmitting data on a specific COM port. It can be used to open two ports on a single machine (a cypress virtual port and a real COM port) and perform both ends of the communication, or it can be used to open one port and simply perform half of the communication.

Serial Test has a known test vector of "0123ABCDEFGHIJKLMNOPQRSTUVWXYZ" which is transmitted. It also expects to receive this same test vector on the other end. Any character that deviates from this vector in the received data is defined as one "Sync Loss". Therefore Serial Test is a simple way to verify the validity of the entire USB to Serial system.

4.2 How to Use

4.2.1 Setup

Once open, Serial Test gives the option to open one or two Serial Ports. If a loopback test is going to be run with only the Serial Test application then open two ports, the Cypress Virtual Port and a real COM port. If Serial Test is going to be run with a companion application such as HidCOMTest or Hyperterminal then just open the single appropriate port.

4.2.2 Configuration

After the ports have been opened all of the appropriate configurations must be set before any data can be transmitted or received. To do this, configure all of the following options and then click on the "Set Config" button:

Baud Rate
Hardware Flow Control

Stop Bits

Parity

Status information such as DSR, CTS, RI, etc, can be monitored by checking the “Status polling enabled” check box.

4.2.3 Communication

Once everything has been configured and the “Set Config” button has been clicked, communication is ready to take place. To transmit click the “Tx Enable” check box. As long as this box is checked transmission will continue; uncheck it to stop. Another option for transmitting is to transmit a single test vector at a time. When “Tx single Bytes only” is checked and the “Tx Enable” is checked then the test vectors won’t continuously stream out. Instead they will have a delay in between transmissions.

Whenever communication takes place a Tx Rate and an Rx Rate will be displayed in the corresponding window. If at anytime communication freezes then these values will drop to zero. All data received will be displayed in the received data window.

If at any point configuration settings need to be changed then the “Tx Enable” must first be unchecked. Once the changes have been made “Set Config” must be clicked before the changes will take place. Once “Set Config” is clicked the “Set Config Needed” indicator will be unchecked and communication is ready to resume.

Serial Test also provides a DTR and RTS check box. These will control the corresponding signal. The user can check and uncheck the RTS box to perform manual flow control. If flow control is enabled in the device, this box should regulate whether data is transmitted or not. The user can also monitor this signal if Serial Test is run on two ports. Manipulating RTS in one port should correspond to the CTS indicator in the other port. The DTR signal works the

Word Length

same way, turning it on and off should change the DSR indicator in the other port.

4.2.4 Error Indicators

Serial Test provides four error indicators, RX Overrun, Rx Overflow, Parity Error, and Framing error. These error boxes are all latching so once one of these occurs the checkbox will stay checked until the “Rese Errors” button is clicked.

The RX overrun and RX overflow errors are related to the OS and the COM port RX FIFO buffer settings. If either of these errors occurs the error isn’t firmware or USB to Serial Driver related and the error can be discounted. The parity error and framing errors are each related to firmware. Should one of these errors occur, the timing of the TX routine in the firmare must be examined.

To exit the application, don’t click on the “X”, instead click on the “Close Port” button in the opening form and then click “Exit or “X”.

5. USB_to_Serial Example

5.1 Purpose

This is an example application written in VisualBasic, illustrating communication between a USB-Serial Bridge device and a user mode application written in VB that uses the Windows HID driver in place of the Cypress HIDCOM driver.

5.2 How to Use

The ReadMe file included with the application provides instructions for the execution and modification of this example.